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In re patent application of: Volker Gedenk, Andreas Kropf and Friedrich Hoppmann

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DESCRIPTION

SPRING ELEMENT FOR RAIL VEHICLES

The invention relates to a spring element and especially to a so-called layer spring which can be used by itself or as an ancillary spring in combination with an air spring in a railroad vehicle in accordance to the preamble of claim 1.

STATE OF THE ART

A spring element for vehicle suspensions is disclosed in the patent DE 35 09 923 C2. The essential features of this spring element are described in the first paragraphs of the disclosure.

The outer contour of the rubber body of the known spring element is smooth. Because of continuously alternating vertical forces, the support surface of the rubber body increases and decreases. The rubber body rolls off on the lower support because of the additionally introduced horizontal forces. Both result in relative movements between the rubber and the support and therefore in friction and wear of the rubber.

TASK OF THE INVENTION

The spring element known from the above-mentioned state of the art is to be improved in such a manner that, during the introduction of vertical and horizontal forces, the wear of the rubber is reduced and a easy horizontal sliding is made possible.

SOLUTION AND ADVANTAGES

The spring element of the invention having the characterizing features of the main claim affords the advantage with respect to the known springs that the ribs on the spring surface form small polygons, especially quadrilaterals (rhombi, rectangles, squares). When the spring element is pressed onto the support, air collects in these polygons. For this reason,

the spring body slides on a plurality of air pillows. Therefore, there is only friction between the rubber ribs and the support surface.

In lieu of the ribbed spring surface or additionally, the entire surface of the spring body including possibly the rib surface and/or the surface of the rigid end bodies arranged relative to each other at a variable spacing can be provided with a sliding surface whereby an abrading action is substantially avoided during the deformation of the loaded spring body.

In a constructive configuration of the ribs arranged on the spring body, it has been shown to be especially advantageous when the ribs are approximately 2 mm high and are mutually spaced approximately 10 mm from each other.

The surface of the ribs can be made from a slide capable material in order to further reduce the coefficient of friction of the spring body. The ribs are preferably configured as so-called wear ribs with the material of these wear ribs being different from the material of the spring body.

The ribs are so configured and dimensioned that they outlive the time of use of the spring element.

With the different measures, a longer use time of the spring element is ensured. The characteristic line of the spring is not influenced by the different friction on the support surface.

DRAWINGS

In the following, an embodiment of the invention is described with reference to the drawings wherein:

FIG. 1 is a front elevation view of a spring element of the invention shown in the unloaded state;

FIG. 2 is a vertical longitudinal section view of the same spring element likewise in the unloaded state;

FIG. 3 is a front elevation view of the same spring element shown in the loaded state; and,

FIG. 4 is a vertical longitudinal section of the same spring element likewise in the loaded state.

DESCRIPTION

The spring element 2 shown in FIGS. 1 to 4 is a so-called layer spring which can be used by itself as a support spring but also as an additional spring in combination with an air spring for supporting the chassis of a rail vehicle.

The spring element 2 essentially comprises an elastic spring body 4 which is attached between two rigid members (6, 8) which are arranged at a variable spacing from each other.

The spring body 4 has a rotationally symmetrical cross section. The longitudinal section (FIGS. 2 and 4) shows an approximately biconvex surface line. A U-shaped cross section results overall because of a cavity 10.

The spring body 4 is of rubber or an elastomeric material of comparable elastic characteristics.

The rigid upper end member 6 has a disc shape and the rigid lower end member 8 is of annular configuration. More specifically, the lower end member 8 has an opening 8a at its center whereby the cavity 10, which is provided in the spring body 4, is connected to the ambient.

The above described assembly is known from the state of the art and is not the object of the present invention. The present invention is directed to the surface configuration of such spring bodies 4.

As can especially be seen in the lateral views of FIGS. 1 and 3, perpendicularly running ribs 14a and horizontally running ribs 16a are arranged on the surface 12 of the spring body 4 in

the manner of degrees of longitude and latitude on a globe. These ribs (14a, ...) and (16a, ...) are approximately 2 mm thick and are positioned at spacings A of approximately 10 mm from each other on the surface 12 whereby a plurality of small enclosed quadrilaterals (18a, ...) is formed.

When the spring body 4 is pressed against the end members (6, 8) functioning as supports, the air builds up which is trapped within the quadrilaterals (18a, ...) between the spring body 4 and the support 6 and/or support 8. When the relative dimensions between the spring body 4 and the respective supports 6 and 8 change with respect to each other because of forces acting on the spring 2, then the spring body 4 does not rub on the supports 6 and 8, but instead, the spring body 4 consisting of rubber slides on the many small air pillows. The above force action can be vertical as well as horizontal whereby a movement in the corresponding direction results. In this way, there is friction only between the rubber ribs (14a, ...) and (16a, ...) and the respective surfaces of the supports 6 and 8.

REFERENCE NUMERALS

2 spring element

4 spring body

6, 8 end members, support(s)

6 upper disc-shaped support member

8 lower annularly-shaped support member

8a opening in the lower support member

10 cavity

12 surface of the spring body

14; 14a, ... perpendicular ribs on the spring body

16; 16a, ... horizontal ribs on the spring body

A spacing between two ribs

18a, ... quadrilaterals, fields enclosed by ribs (14, 16)